Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of

Petition of the National Association for Amateur Radio	)	
For a Rulemaking to Amend the	)	
Amateur Service Rules	)	RM 11325
Facilitate Use of Spread Spectrum	)	
Communications Technologies	)	

OPPOSITION OF TROPOS NETWORKS

Tropos Networks (Tropos) submits this Opposition in response to the Petition for Rulemaking filed by the National Association for Amateur Radio, also known as The American Radio Relay League, Incorporated ("ARRL"). The Petition would eliminate the provision of the Commission's rules set forth at Section 97.311(d) requiring Amateur operations using spread spectrum technology to use an automatic power control device. ARRL provides no analysis, evidence or information to support its proposal. Its Petition should be dismissed as it fails to justify how users of frequency bands shared with Amateur service operations will be protected.

Tropos Networks

Tropos Networks, headquartered in Sunnyvale, California, provides wireless technology that delivers broadband access using unlicensed spectrum at 2.4 GHz. Tropos is the technology provider to EarthLink in its Philadelphia and Anaheim projects, and in the Google EarthLink San Francisco project. Tropos equipment in New Orleans, in place prior to Hurricane Katrina to support video surveillance, is being expanded. Tropos metro scale Wi-Fi technology is providing broadband services to citizens,

businesses and government agencies throughout the United States at substantial cost savings over incumbent providers.

Tropos technology is a form of wireless mesh networking. The system can transmit voice, data, video, photographs and a range of other broadband applications within the 2.4 GHz band. Any laptop or other device with Wi-Fi capability can connect to the network of antennas, even while the owner carries the device from place to place. The network consists of routers with antennas, the size of a breadbox, mounted to street lamps and telephone poles. A typical metro scale mesh network encompasses a large geographic area with approximately 20 routers per square mile.

Tropos Networks is but one of several manufacturers that are partnering with service providers to deliver broadband to businesses, governments and consumers using the 2.4 GHz unlicensed band. ARRL's proposed amendment of the Commission's rules would affect this use. The Amateur Services rules in Part 97, particularly section 311(d), afford interference protection not only to Amateur operations but other users of the band, both licensed and unlicensed. The innovation pervading Wi Fi technology, the growing investment committed and the expanding number of deployments demonstrate the emergence of critical facilities based broadband providers to a market that desperately needs competition. The 2.4 GHz band is a vital resource in delivering more choice and more affordable broadband. Provisions of the Commission's rules affording protection against interference are crucial to the continued rollout of broadband.

THE ARRL PETITION

In 1999, the Commission amended the Amateur Service rules to allow Amateur stations to transmit the range of spread spectrum emission technologies. The

Commission conditioned its decision on each spread spectrum transmitter incorporating a device automatically limiting power to that actually necessary to carry out the communication.[1] The use of automatic power controls by Amateur stations transmitting spread spectrum emissions reduces the interference potential. The requirement is consistent with the obligation of an Amateur station to use the minimum power necessary to carry out the intended communications regardless of the emission type, spreading technique, or frequency band used.[2]

Faced with advocacy from unlicensed users opposing the expansion of Amateur service spread spectrum and Amateur service interests proposing a complete deregulatory environment, the Commission concluded that automatic power control was a reasonable way to protect against interference in a challenging environment. It noted the need for automatic power control in mixed-mode frequency bands until sharing protocols are sufficiently developed to satisfy users that stations can avoid inter-mode interference. It specifically declined to eliminate the automatic power control requirement in exchange for imposing a power limit on transmissions. Underlying the Commission's decision was promoting use of the band by all users, not only licensed. The rules seek to ensure that the output power is limited to the minimum level necessary to conduct communications so that interference with other Amateur radio stations and users of the frequency bands would be minimized.

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[1] In the Matter of the Amateur Service Rules to Provide Greater Use of Spread Spectrum Communications Technologies, *Report and Order*, WT Docket 97-12, FCC 99-234 at paras 12-14 (September 3, 1999).
[2] Section 97.313(a). Section 97.311(d) and In the Matter of Amendment of the Amateur Service to Provide For Greater Use of Spread Spectrum Communications Technologies, *Report and Order* at para 11, WT Docket 97-12, RM-8737, FCC 99-234 (September 3, 1999).

ARRL now proposes to eliminate the automatic power control provision it originally proposed and which it endorsed as recently as 2004.[3] It relates no sharing protocols that have emerged to satisfy users that inter modal interference will be avoided. It does not detail or analyze the effect of its proposal on other users of the band. It makes no mention that wireless mesh technologies in the 2.4 GHz band have emerged as a real competitor to incumbent providers of broadband.

Instead, ARRL states that the automatic power control has proven over time to be impractical and is a deterrent to spread spectrum experimentation. It states that the standard is impossible to implement; yet it also says that it has proven an impossible task in many but not all applications. ARRL's position is that Amateur spread spectrum equipment cannot be configured to calculate the lowest transmitter power necessary by reference to the remote receiver or to multiple receivers in many applications. ARRL provides no details with regard to these applications. Nor does ARRL enumerate how advances in spread spectrum would otherwise have taken place without the requirement.

ARRL FAILS TO SUBSTANTIATE WHY THE AUTOMATIC POWER CONTROL RULE SHOULD BE ELIMINATED

The Commission's rules require that a Petition for Rulemaking be supported by "facts, views, arguments and data deemed to support the action requested..."[4] ARRL provides nothing but its assertion that Section 97.311(d) is impossible to implement, a notion it has not suggested in the over six years the rule has been in effect, even when

[3] Comments of ARRL at pages 10-11, dated June 15, 2004 in response to In the Matter of Amendment of Part 97 of the Commission's Rules Governing the Amateur Radio Service, *Notice of Proposed Rulemaking*, WT Docket 04-140, FCC 04-79 (April 15, 2004).

[4] Section 1.405(d) of the Commission's Rules.

provided the opportunity to do so.[5] It says that automatic power control is hard to accomplish in many applications so it should be abandoned. Its underlying logic is that manual control is easier than automatic control. The Commission's standard to amend its rules requires more. Proposals eliminating interference protections must demonstrate how users will continue to be protected.

Spread spectrum is a modulation technique that distributes the energy of a transmitted signal over a segment of spectrum that is much larger than would be needed for a traditional modulation scheme. An unlicensed device will receive a spread spectrum transmission from an Amateur radio station and the potential for interference is substantial in view of the difference in power levels. There is an important limitation on Amateur authorized power levels which is crucial to the shared character of the 2.4 GHz band. While authorized at 100 watts, power levels may only be at the minimum necessary to carry out the communication.[6] In Tropos' experience with the deployment and expansion of metro scale mesh networks, this challenge the shared spectrum environment faces is not an unusual occurrence. The automatic power control is critical in providing a degree of interference protection to others users of the band.

Automatic power control is used in a range of radio technologies; at its core is protecting other operations by limiting the power levels emitted. A transmitter and infrastructure is constructed to serve a particular distance. From the propagation formulas premised on the frequency band and equipment, the maximum power needed can be determined. What the automatic power control does, beyond overcoming the deficiencies innate to manual systems, is to base calculations on the actual RF

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[5] Id at footnote 3.
[6] Id at footnote 2.

environment, thereby determining much more efficiently and effectively the minimum power needed. In virtually all digital communications systems, there is a feedback loop, which allows the automatic power control to calculate the power the base station needs. In shared spectrum, the automatic power control is a crucial facet permitting and promoting the shared environment of the band. Removing the automatic character of the technology will inevitably lead to higher power levels and interference to and degradation of less powerful transmissions.

The obligation to use automatic power control in Amateur Service spread spectrum transmitters was premised on protecting other users in the band. The reality is that the Amateur service is authorized at significantly higher power levels yet is obligated to use only the power necessary. The balance the Commission struck, in the context of several interests that opposed expanding spread spectrum applications in the Amateur bands and concerned about the high power levels, was to allow the higher power contingent on the presence of automatic power control. This circumstance has not changed; the need to protect other users of the spectrum, particularly with regard to the expansion of broadband distribution in 2.4 GHz, makes it even more important.

There are environments that while difficult, fall far short of the impossible. Where there are a large number of receivers, some of which could be very far away, it can be a challenge for the very distant receivers to know that there is an available base station. From a technical perspective it is more expensive to design a system encompassing automatic power control than not; where there are many clients the base station must maintain a table of all. In contrast to ARRL's general position, these circumstances entail more work but not the impossible. As to circumstances where

ARRL claims an automatic power control has no means to set the appropriate power levels, it is not a solution to eliminate it; a manual system has no means accomplish the task. ARRL's proposal confers primary use status on Amateur spread spectrum operations in each band it is permitted. This will destroy the balance the Commission has promoted in the 2.4 GHz band among all users. It will accrue to the detriment of Tropos' Wi-Fi users and to narrowband Amateur operations.

ARRL ignores the presence of unlicensed users in the bands it operates in. Its failure to address the impact is fatal to a process that requires detail and analysis. The Commission has made clear that it must consider the effect on unlicensed use in a band when it examines proposed amendments to its rules.[7] The consistent premise is whether a rule change affecting different uses ultimately is compatible with each and promotes efficient use of spectrum. The analysis requires that the Commission consider both licensed and unlicensed use. The 2.4 GHz band has a mix of uses, Part 15, Part 18 and Amateur users. ARRL's Petition does not afford the Commission the opportunity to consider how its proposed elimination of the automatic power control affects the interference potential.

Tropos Networks, in constructing and deploying its Wi Fi mesh broadband systems, commits substantial effort to examining the RF environment, including the presence of Amateur service operations. Throughout it embraces a cooperative approach that is a fundamental to the spectrum that Amateur services and unlicensed users operate in. These efforts have included coordination and cooperation with Amateur service

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[7] In the Matter of the Amendment of Parts 2 and 97 of the Commission's Rules to Create a Low Frequency Allocation for the Amateur Radio Service *et al.*, *Report and Order,* ET Docket 02-98, FCC 03-105 (May 14, 2003)

interests. Tropos experience has been one of mutual respect emanating from the commitment by both interests to innovative technology that promotes spectrum efficiency and service to the American people. These efforts have led to a resolution of a number of challenges that were initially faced. One of the underlying premises of the cooperation has been the reliance on the automatic power control in spread spectrum circumstances.

Tropos seeks to continue this cooperation. It is not opposed to examining spread spectrum operations in the Amateur service to promote further experimentation. Nor is it inalterably opposed to rule changes that seek this objective. The ARRL Petition however provides neither the information or evidence with regard to the ramifications of the change or the benefits that will accrue.

Conclusion

By eliminating automatic power control, ARRL proposes to deregulate spread spectrum emissions. Yet it provides no interference limiting concepts, much less the

particulars of how eliminating automatic power control will affect other users, a technical development that must precede any reasonable discussion of alternatives.[8] For this reason, ARRL's Petition for Rulemaking should be dismissed.

Respectfully submitted,

Tropos Networks

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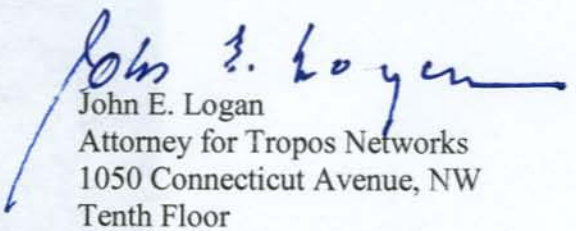

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[8] See Reply Comments of ARRL, dated June 5, 1997 at page 9, WT Docket 97-12.

Certification

The Opposition of Tropos Networks addressing the Petition for Rulemaking of The American Radio Relay League, Incorporated, was filed with the Commission's Secretary via its electronic filing system. A copy was sent via First Class Mail to:

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